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ABSTRACT

Two studies investigated the origins of message evaluation skills in preschool children. In the first study, 14 preschoolers and 14 second graders were asked to evaluate the informativeness of pictorial messages in a referential communication task in two sessions. Results showed that the younger children overestimated the informativeness of ambiguous messages even though they realized that the messages described two referents. Their performance did not improve in the second session. Results of the second study, which concerned 14 preschool, 14 kindergarten, and 14 second-grade students, provided support for a hypothesized developmental sequence in the acquisition of message evaluation skills. Children's performance suggested that at first they evaluated all messages as informative, even those that did not describe the target referent, because they did not distinguish the information in the message from their own knowledge or beliefs about what the speaker intended. Subsequently, children began to understand that the message was a source of knowledge and evaluated its quality apart from what they knew or believed to be true. Over 30 references are cited. (RH)

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The development of message evaluation skills in young children

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Running head: MESSAGE EVALUATION

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Abstract

While much research has focused on elementary school children's ability to monitor their comprehension, relatively little is known about the origins of message evaluation skills in preschool children. Two studies were conducted to address this issue. In the first study, 4-7 year old children were asked to evaluate the informativeness of pictorial messages in a referential communication task, in two sessions. The results showed that the younger children overestimated the informativeness of ambiguous message even though they realized that the messages described two referents, and that their performance did not improve across sessions. The results of the second study provided support for a hypothesized developmental sequence in the acquisition of message evaluation skills: Children first believe that all messages are informative, even those that do not refer to the target; then correctly reject messages that do not describe the target; and finally reject messages that describe other referents in addition to the target. Implications for children's developing understanding of knowledge and its sources are discussed.

The development of message evaluation skills in young children

Many studies have shown that elementary school children tend to overestimate the communicative quality of messages and to believe that they and other people understand messages that are actually uninformative (Dickson, 1981; Flavell, Speer, Green & August, 1981; Markman, 1977, 1979; Whitehurst & Sonnenschein, 1985). There appear to be several factors that contribute to children's poor message evaluation skills. For example, Ackerman (1981) and Speer (1984) have found that when children are presented with ambiguous messages they tend to select the first referent they see that is described by the message. Capelli and Markman (1985; Markman, 1981) have also found that children do not actively process the information in the message and so do not detect contradictions and ambiguities. Other researchers have found that children lack a clear understanding of the role of the message as a representation of the speaker's intended meaning, and that they tend to confuse what was actually said with what they know or assume the speaker must have meant (Beal & Flavell, 1984; Bonitatibus, 1988; Robinson & Whittaker, 1986; Robinson, Goelman & Olson, 1983).

While much research has focused on message evaluation skills in elementary school children, there has been relatively little research on the origins of these abilities in preschool children. Preschoolers do appear to have acquired some knowledge about the role of the message in communication. For example, Whitehurst and Sonnenschein (1985) argue that preschoolers consider the listener's characteristics (such as age) and information requirements when producing a message. In addition, preschoolers often respond to signs of confusion by the listener by attempting to reformulate the message, although they are not always successful in improving its communicative quality (Peterson, Danner & Flavell, 1972). Revelle, Wellman and Karabenick (1985) presented 2 1/2 - 4 1/2 year olds with problematic messages,

including unintelligible remarks and requests by the experimenter for the child to bring an object that was not in the room or that was too heavy for the child. Their results showed that the children reacted to the problematic messages with signs of confusion, suggesting that they recognized when the message was not clear. However, the children were not asked to evaluate the quality of the message directly so it is not clear whether they would have rejected it as inadequate or blamed it for their uncertainty. In addition, their questions and behavioral signs of confusion might have reflected the fact that they could not comply with the experimenter's request rather than a realization that the message itself was unclear.

Studies of young children's ability to evaluate messages directly for their communicative quality suggest that preschoolers' knowledge about the requirements for informative messages is relatively limited. One requirement for an effective message is that it must not describe another object in addition to the target (Whitehurst & Sonnenschein, 1985). Several studies suggest that 5-6 year old children overestimate the communicative quality of ambiguous messages. For example, Flavell et al. (1981) found that kindergartners were confident that they knew exactly how to construct sets of block buildings even though the speaker's instructions had been ambiguous. Similarly, kindergartners considered an ambiguous message to be informative even when they recognized that the message had an alternative interpretation (Beal & Flavell, 1982; Robinson & Robinson, 1983). However, other researchers have found that children do not always scrutinize all of the referents carefully or compare their features to those mentioned in the message, and that they tend to select the first referent they see that matches the description provided by the message without checking the additional referents (Ackerman,1981; Ironsmith & Whitehurst, 1978; Speer, 1984). Young children's tendency to overestimate the communicative quality of ambiguous messages might therefore be exacerbated by a failure to perform carefully the appropriate comparisons. One goal

of the present research was to learn the extent to which preschoolers would overestimate the quality of ambiguous messages when they were shown that the messages described more than one referent.

In addition to learning that an effective message should not be ambiguous, young children must also learn about another basic requirement, namely, that the message must in fact describe or refer to the target object. Although this requirement seems relatively obvious, studies of children's knowledge about retrieval cues suggests that it may not necessarily be understood by preschoolers. For example, Gordon and Flavell (1977) found that 3 1/2-5 year olds did not discriminate between pictorial retrieval cues that were and were not semantically associated with the hidden target picture; in fact, the children behaved as if they thought *all* the picture cues would help them remember the target picture. Similarly, Beal (1985) and Ritter (1978) found that preschoolers thought that *all* markers would help them relocate a hidden toy, even though some of the markers had been placed on non-target locations. An additional goal of the present research was therefore to learn whether preschoolers would understand that messages that did not describe the target were uninformative. Finally, we were interested in whether these two components would form a developmental sequence, that is, whether young children would first evaluate all messages as informative, then reject those that did not describe the target, and finally reject those that described another object in addition to the target.

Experiment 1

In the first experiment preschool and second grade children were asked to evaluate the communicative quality of messages in a referential communication task. Pictures were used as referents and messages in an attempt to equate the task in terms of familiarity of materials and message format for older and younger children (Beal & Flavell, 1984; Gordon & Flavell, 1977). The experimenter also pointed out the differences between the referents before asking the child to evaluate the

communicative quality of the message, to ensure that the child was aware that some of the messages described more than one referent. In addition, each child participated in two sessions, to learn whether the younger children might improve as they became more familiar with the task and experienced uncertainty in identifying the target referent.

Method

Subjects. Fourteen preschoolers (M = 4-8) and fourteen second graders (M = 7-10) participated in the study. There were approximately equal numbers of boys and girls. The children attended a day care center and elementary school located in a lower middle class rural area near a small New England university.

Materials. The materials included eleven sets of three 4 x 6 inch picture cards. The pictures were drawn with brightly colored felt pens and were covered with clear plastic. The pictures were of common objects such as a Christmas tree, a mouse, a flower, etc. The three pictures in each set showed the same object with different features; for example, one Christmas tree had red ornaments and candy canes; a second tree had presents under it but no ornaments or decorations; and a third tree (the target) had red ornaments and a gold star. The target picture was marked with a large black dot on the back.

For each set of pictures there were also three 3 x 4 inch picture clues (although each child saw only one clue per set.) The picture clues showed individual features of the objects. One picture clue was effective, a second clue was ambiguous and a third clue was ineffective. For example, for the Christmas tree picture set, the effective clue was a gold star (because only the target had a gold star). The ambiguous clue was a red ornament (because both the target and a second picture had red ornaments), and the ineffective clue was a picture of presents (because the target did not have presents.) The clue used with each picture set was varied systematically across children.

Procedure. Each child was interviewed individually in two sessions one week apart by a female experimenter. There were ten trials in both sessions, including five ambiguous clue trials, four effective clue trials, and one ineffective clue trial. Picture sets were presented in one of two randomly determined orders. The sessions lasted 15-20 minutes each.

In the first session, the experimenter explained that she would show the child some pictures and ask him or her some questions about them. She showed the child the first set of pictures and slowly pointed out the differences between them, making sure the child looked carefully at the pictures. For example, she said, "This tree has red balls (ornaments) and candy canes on it. This tree has red balls too, but it also has a gold star on top. This tree doesn't have red balls or candy canes or a gold star, but it has presents under it." The experimenter then turned over the pictures to show the child that one of the three pictures was marked on the back, and explained that the child would have to find the marked picture again. She then turned the pictures back over so that the mark was hidden, and introduced a picture clue that could help the child find the target picture again (the term "clue" was used because it suggested communicative intent without necessarily implying complete informativeness.) She warned the child that some of the clues were "tricky" or "not so good" and would not help the child find the target. She showed the child an effective clue, asked the child to evaluate it, and explained that it would help the child find the target because only the target had that feature. She then showed the child an ambiguous clue, asked the child to evaluate it, and explained that it would not help because two of the pictures had the designated feature so the child could not be completely sure which picture was the target. For half the children, the evaluation question was worded in terms of whether the picture clue would help the child "find" the target picture; the remaining children were asked if the picture would help them "remember" the picture.

Ten test trials followed the practice trial. On each trial the experimenter pointed out the differences between the three pictures, showed the child the target, presented a picture clue, and asked the child to evaluate its communicative informativeness. The target picture was identified before the clue evaluation question because children might reasonably have said that the ambiguous clues were helpful when the alternative was uninformed guessing. At the end of the session the experimenter explained that she would come back the following week to play the game again with the child.

The second session was conducted to determine first, whether children might evaluate the clues more accurately after a 5-7 day delay (when they might be more aware of the uncertainty involved in relocating the target picture) and second, whether they might perform better when they were more familiar with the task. As in the first session, there were ten trials. On each trial, the experimenter showed the child the three picture cards, reviewed the differences between them, and asked him or her which was the target (to check whether the child could remember without the aid of a clue.) She then showed the child the target picture, presented a picture clue and asked the child to evaluate it. Children evaluated new clues for the picture sets in the second session.

Results and Discussion

The number of ambiguous, effective and ineffective clues correctly evaluated was summed for each child. Preliminary comparisons showed no effect of presentation order of the picture sets, question wording ("find" or "remember") or sex of subject. An Age (2) x Session (2) analysis of variance, with Session as a within-subjects factor, was performed on the scores for the ambiguous clues. There was an effect of Age, $F(1,26) = 23.75$, $p < .01$. In the first sesson, preschoolers correctly evaluated an average of 1.71 of the five ambiguous clues, while the average for the second graders was 3.78. There was no effect of Session, however, the mean number of

clues correctly evaluated by preschoolers in the second session dropped to 1.14, while the average for second graders in the second session was 4.00.

In contrast to the results for the ambiguous clues, an Age (2) x Session (2) analysis of variance on the effective clue scores showed no effect of age. In the first session, preschoolers correctly evaluated an average of 3.65 of the four effective clues, compared to a perfect score of 4.00 for the second graders. In the second session, both ages performed perfectly ($\underline{M}$ = 4.00) in evaluating the effective clues. On the ineffective clue trial, the mean for the younger children was 0.93 in the first session and 0.64 in the second session. In contrast, the older children scored perfectly ($\underline{M}$ = 1.00) in both sessions.

The number of target pictures correctly recognized in the second session was summed for each child. There was no difference in memory performance for the older and younger children, $\underline{t}(26) = 1.39$ N. S. Older children identified an average of 6.5 of the ten target pictures, while the younger children identified an average of 5.6 pictures. There was no relationship between children's memory for the target pictures and their clue evaluation. Children who evaluated a clue correctly in the first session were not more likely to remember the target in the second session. Similarly, children who did not recall a target picture were not more accurate in evaluating its clue in the second session.

Despite the experimenter's effort to make the task clear, including pointing out the differences between pictures, warning the child that some clues were not helpful, and providing examples of good and inadequate clues, the four year olds overestimated the informativeness of many of the picture clues. In addition, the four year olds did not improve with practice and familiarity with the task. It is possible that children thought that even the uninformative clues might have been more helpful than simply

guessing; for example, a child might have reasoned that an ambiguous clue would at least narrow the possibilities to two rather than three referents, or that the ineffective clue might have triggered some personal association in memory that could help him or her remember the target referent (Gordon & Flavell, 1977). However, it seems reasonable to assume that the seven year olds were more aware of such possibilities than the four year olds, and the older children were significantly more likely to reject the ambiguous and ineffective clues as uninformative.

In addition to their overconfidence in the ambiguous clues, some aspects of the four year olds' performance also suggested that they thought *all* the clues were helpful. While most of them correctly rejected the ineffective clue in the first session, several reported that it was informative in the second session. However, since there was only one ineffective clue trial in each session it was difficult to determine whether the four year olds actually realized that the ineffective clue was uninformative, and more generally, whether this realization would preceed or follow the recognition that the ambiguous clues were ineffective. The goal of the second study was therefore to test for a possible developmental sequence in the development of message evaluation skills: first, saying that all clues were helpful (even those not associated with the target), second, rejecting ineffective clues (those not associated with the target at all), and finally, rejecting ambiguous clues (those associated with the target and another picture.)

Experiment 2

Method

Subjects. Fourteen preschoolers (M = 4-7), fourteen kindergartners (M = 5-8) and fourteen second graders (M = 8-0) participated in the study. Children attended schools in the same area as those in the first study. There were approximately equal numbers of boys and girls.

Materials. The picture sets and accompanying clues from Experiment 1 were

used in this study, along with two additional picture sets.

Procedure. Each child was interviewed individually in an empty office in his or her school. The procedure was similar to the first experiment: The experimenter introduced the task with a practice trial and warned the child that some of the clues were not helping in locating the target picture. On each trial, the experimenter pointed out the differences between the pictures and identified the target picture. She then showed the child a clue picture and asked him or her to evaluate it. No feedback about clue informativeness was provided after the practice trial. There were four ambiguous clue trials, four ineffective clue trials, and four effective clue trials. Order of presentation of the picture sets and clues was varied across children. The session lasted approximately 20 minutes.

Results and Discussion

The number of correct evaluations of the ambiguous, ineffective and effective clues was summed for each child. These scores were analyzed in an Age (3) x Clue Type (3) analysis of variance, with Clue Type as a within subjects factor. The results showed an effect of Age, $F(2,39) = 31.08$, $p < .001$. Newman-Keuls comparisons ($a < .05$) showed that the second graders ($M = 11.53$) correctly evaluated significantly more of the twelve clues than the kindergartners ($M = 9.53$), who in turn performed better than the preschoolers ($M = 6.49$). There was also an effect of Clue Type, $F(2,78) = 42.29$, $p < .001$. Newman-Keuls comparisons showed that performance was significantly better for the effective clues than the ineffective clues, and that both the effective and ineffective clues were evaluated correctly more often than the ambiguous clues. Finally, there was an Age x Clue Type interaction, $F(4,78) = 9.92$, $p < .01$. An analysis of simple effects showed that the two younger groups overestimated the informativeness of the ineffective and ambiguous clues, while the second graders evaluated all clue types correctly. Mean scores are shown in Table 1.

Table 1 about here

Three response patterns were proposed to test the hypothesized developmental sequence of message evaluation skill. In the first proposed pattern, children would evaluate all clues as informative, meaning that they would correctly evaluate the effective clues but not the ineffective or ambiguous clues. In the second pattern, children would correctly evaluate the effective and ineffective clues but not the ambiguous clues. In the third pattern, children would correctly evaluate all three clue types. The responses for each child were compared against these patterns according to the following criterion: at least three of the four responses for each clue type must conform to the pattern. For example, a child who correctly evaluated three of the four ambiguous clues and all of the remaining clues was classified as Pattern 3, while a child who correctly evaluated all four effective clues, incorrectly evaluated all four ineffective clues, and incorrectly evaluated three of the four ambiguous clues was classified as Pattern 1. The responses of only one child, a kindergartner, did not fit one of the hypothesized patterns. The number of children in each grade whose responses matched one of the three patterns is shown in Table 2. A chi square test showed that there was a significant association between age and response pattern, $\chi^2(4) = 33.67$, $p < .001$.

Table 2 about here

General Discussion

As in previous research, the 4-5 year old children in these studies generally overestimated the communicative quality of ambiguous messages (Beal & Flavell, 1981; Robinson & Robinson, 1983). However, in earlier studies children had been asked about the quality of verbal messages, which might have been particularly

difficult for young children to evaluate due to their ephemeral nature (Bonitatibus & Flavell, 1985; Bonitatibus, 1988). In the present studies children were asked to evaluate the information provided in pictorial messages which were concrete and available for reinspection. In addition, the experimenter performed the requisite comparisons of the referents for the child. Despite these changes, the 4-5 year olds in these studies continued to overestimate the quality of the ambiguous messages.

The results from these studies also extend our knowledge about how message evaluation skills develop in young children. Previously, there had been few systematic comparisons of children's evaluation of messages in terms of their degree of association with the target referent. The results suggest that children learn about the requirements for informative messages in a specific developmental sequence. In particular, the pattern of responses suggested that children first consider all messages to be informative, then reject messages that do not refer to the target referent, and finally reject messages that refer to another object in addition to the target. Almost all the children who participated in the second experiment showed responses that were consistent with the hypothesized patterns, and there was a strong association between age and the maturity of the response pattern. It is possible that children might have more easily recognized the uninformative nature of the ambiguous messages if the messages had described more than one other non-target referent. Patterson and her colleagues (Patterson, Cosgrove & O'Brien, 1980; Patterson, O'Brien, Kister, Carter & Kotsonis, 1981) found that preschoolers and kindergartners were more likely to detect that a message was ambiguous as the degree of ambiguity was increased.

One important question is why the younger children in these studies reported that messages that did not even describe the target referent were informative. The possibility of an affirmative response bias in young children must be considered;

however, the experimenter explicitly told the children that some of the picture clues were not helpful and provided specific examples of informative and uninformative clues. In addition, most children did say that at least one of the clues was uninformative, suggesting that they were not afraid to be critical. Another possibility is that the youngest children never completely understood that the object of the task was to identify the target referent, and that the function of the clue was to help the child achieve this goal. However, if this had been the case the preschool children in the first experiment should have improved in their clue evaluation after they had been asked to identify the target pictures in the second session, but they did not.

An alternative interpretation is that the younger children were evaluating their own state of knowledge rather than the relationship between the quality of the clue and that knowledge state. Previous studies have shown that first grade children fail to distinguish between what they know or assume a speaker meant, and the information that was actually conveyed by the message (Beal & Flavell, 1984; Bonitatibus, 1988). Children who had not acquired this distinction might therefore be unable to evaluate the information in the message apart from their own knowledge state. Thus, the four year olds in these studies may have reasoned that the message was informative because they knew the identity of the target referent. Their failure to distinguish their knowledge from the information in the message was particularly striking since some of the messages did not even share a common feature with the target referents.

The notion that in the early stages of message evaluation skill children evaluate their own knowledge rather than the message is consistent with other findings, particularly children's focus on the outcome of a communication when evaluating message quality. Children tend to assume that the message was clear when they happen to choose the correct referent by chance, and do not realize that the message may not

actually have provided enough information to be reliable (Singer & Flavell, 1981). Conversely, when the communication fails children assume that the listener is at fault for not knowing the correct referent, rather than blaming the speaker for not providing enough information (Robinson, 1981). In addition, children weigh the listener's erroneous report of his knowledge state more heavily than their own correct evaluation of the message quality (Beal & Flavell, 1983). Wimmer and his colleagues have also found that four year olds do not consider the *quality* of the information provided to the listener when they are asked to assess his or her knowledge, only whether or not the listener has perceptual or communicative access to the information (Sodian & Wimmer, 1987; Wimmer, Hogrefe & Sodian, 1986). Thus, in both cases of communicative success and communicative failure young children first appear to evaluate their own or another listener's state of knowledge, rather than the quality of the message as the source of that knowledge state.

Although young children's tendency to evaluate what they know makes it difficult for them to evaluate accurately the quality of the message, it does represent an important first step in the development of message evaluation skills. That is, the ability to judge what is and is not currently known should be a necessary prerequisite to a judgment of exactly how that knowledge state was achieved, and in particular, the contribution of the message to that knowledge. Wimmer, Hogrefe and Perner (1988) have shown that younger children (three year olds) can reliably report whether or not they know a particular fact, although they cannot tell how they acquired their knowledge. Thus, the initial step in the development of message evaluation skills may be for the child to check for his or her own feelings of certainty, or to observe the outcome of the communication, in order to determine whether or not the target referent is known. The results of these studies, along with those of Wimmer et al. (1988) suggest that this development occurs at around 3-4 years. Subsequently, children must begin to identify the sources of their own and other

people's knowledge and to learn to evaluate their communicative quality.

In contrast to the youngest children, the older children in these studies did appear to evaluate the message itself, rather than their own knowledge about the referent. In particular, they rejected the ineffective clue as uninformative because it did not describe the target, despite their own knowledge of its identity. However, they did not yet realize that the ambiguous messages were uninformative. Only the performance of the oldest children was consistent with previous research in showing that by about 6-7 years children have acquired an understanding of ambiguity. While it was not assessed in these studies, another recent experiment suggests that there might also be a subsequent stage in the developmental sequence of message evaluation skill: Children may next learn that they can influence as well as predict the knowledge state of another person by varying the quality of the message. Sodian (1988) has found that it is not until about seven years that children realize that they can deliberately fool or mislead a competitor by producing ambiguous messages.

In summary, the results of these studies suggest that there is a specific sequence to the development of message evaluation skills in preschool and kindergarten children. The performance of the children in these studies suggested that they first evaluate all messages as informative, even those that did not describe the target referent, because they do not distinguish the information in the message from their own knowledge or beliefs about what the speaker intended. Subsequently, children begin to understand that the message is a source of knowledge and to evaluate its quality apart from what they know or believe to be true. However, it is not until children are about 6-7 years old that they realize that an ambiguous message can lead to misunderstandings, in particular, to a state of knowledge that may not necessarily match the speaker's intended meaning.

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Table 1

Mean message evaluation scores from Experiment 2

	Message Type:		
Age:	Effective	Ineffective	Ambiguous
4 years	3.93	2.14	0.42
5 years	3.92	3.61	2.00
7 years	3.93	4.00	3.60

Note: Maximum score is 4 per cell.

Table 2

Number of children fitting response patterns in Experiment 2

	Response Pattern:		
Message Type:	1	2	3
Effective	+	+	+
Ineffective	-	+	+
Ambiguous	-	-	+
Age:			
4 years	6	8	0
5 years	1	7	5
7 years	0	0	14

Note: "+" designates correct evaluation of message type; "-" indicates incorrect evaluation.